



APPLICATION FOR PATENT

TITLE: AUTOMATED SELF-SERVICE MAIL PROCESSING AND STORING SYSTEMS

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BACKGROUND OF INVENTION:

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This is a continuation of ~~pending application Serial No. 08/284,910~~, filed August 2, 1994, which is a continuation-in-part of application Serial No. 07/994,182, filed December 21, 1992 and abandoned, which is also a continuation of application Serial No. 07/678,863, filed April 1, 1991 and abandoned on December 21, 1992.

1. Field of invention:

The present invention is related to automated self-service systems for processing and storing items such as letters and packages for subsequent shipment by a commercial carrier.

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10 2. Description of the Related Art:

Presently, many commercial carriers such as the United States Postal Office and Federal Express, for example, provide drop boxes whereby individuals may ship their letters or packages without having to travel to the carrier's particular shipping station. A disadvantage of this system is that such boxes cannot be used where the item must be weighed prior to shipping in order to calculate the cost.

Another disadvantage is that often the user must have a pre-assigned charge account, or he or she must use a specialized mailing envelope. In addition, the types of mail services from which a user may wish to use are very limited.

While perhaps not widely used commercially, there are several types of automated self-service mailing machines for processing mail for shipment described in various U.S. patents. U.S. Patent No. 5,233,532 to Ramsden, for example, is directed to a mailing system which allows a user to process and store mail items for subsequent pick-up by a commercial carrier. In particular, the user is able to enter identification information into the system for purposes of payment, enter destination information for shipment, weigh the item, obtain a charge for shipping the item, and deposit the item into a locked storage area. The system contains an intermediate deposit area ("secured deposit means") which is separated by two inner doors from the storage area. The system contains an electronic scale separate from the intermediate deposit area. After the item is weighed, it is placed into the intermediate deposit area. Once the user closes an outer door to the intermediate area, the item is moved through the inner doors by a series of rollers into a storage area. While this reference suggests the re-weighing of the item to obtain an accurate weight, there is no mechanism to prevent the user from weighing a lighter object to obtain a low cost, and then placing into the intermediate deposit area the heavier item to be shipped.

U.S. Patent Nos. 5,065,000 ("'000"), 4,923,022 ("'022"), and 5,025,386 ("'386") to Pusic are also directed to automated mail systems designed to process and store items, in particular letters. The systems described in these references contain internal weighing means and means for printing

machine-readable information (i.e. bar codes) onto the item to be mailed. These references do not appear to teach or suggest a single, rotatable postage meter for generating and dispensing postage meter stamps or strips, nor do they teach a weighing scale capable of detecting minute vibrations that will not operate until such vibrations are absent. Moreover, the references do not teach a tracking bar code verification system to verify that a letter has a tracking bar code or a readable tracking bar code on it.

Thus, it is desirable to have an automatic self-service mail processing and shipping system that allows a user to weigh the mail item securely and accurately to prevent tampering, select from several different mail services (e.g. package or letter, First Class or International), calculate and pay the charge for shipping, obtain a receipt, securely store the item for subsequent pick-up by a commercial carrier, and that is fully capable of processing and storing packages as well as letters. It is also desirable to have a system that includes a single postage meter that is capable of printing a stamp directly onto a letter as well as dispense a postage meter strip for subsequent affixation onto a package or letter.

Certain carriers, such as the United Parcel Service and Federal Express, for example, require that tracking bar codes be placed onto the letters or packages. It is therefore also desirable to have a system that is capable of not only generating a tracking bar code for affixation onto a shipping item, but also have a means for verifying that the item contains the required tracking bar code or contains a tracking bar code that can be read or detected by a bar code scanner.

SUMMARY OF THE INVENTION:

The present invention is directed to automated self-service mailing systems which will process and securely store packages and letters of various sizes for subsequent pick-up
5 by a commercial carrier. In certain embodiments, inventive system includes:

an outer housing;

means for weighing an item which a customer may intend to ship;

10 means for inputting information relating to the destination of the item from customer;

control means for calculating a shipment fee for the item, said control means being in communication with said weighing means and said information inputting means;

15 means in communication with said control means, for accepting identification information relating to eventual payment from the customer, said communication means comprising means for receiving and reading a credit card, means for communicating the charges information to a central location
20 for billing the charges to said customer;

a storage area defined by said outer housing; and

secure deposit means for permitting a customer to securely deposit the item into the storage area, said secure deposit means including a first zone which serves as a holding
25 space when said item is first placed in the storage area and a secure zone into which the item is moved for secure storage.

The inventive system further comprises in certain embodiments a means for storing the inputted information once said item is disposed in the secure storage means, wherein the
30 information storage means also includes a means for transmitting a manifest to a remote location. Other embodiments include a means for assessing the shipment fee to

the account of the person (i.e. user), wherein the means assessing comprises means for printing a hard copy of the account charge to the user.

5 The inventive system also has a novel weighing means for both packages and letters which can detect minute vibrations, such as those caused by a human hand, and thus will not weigh the device until such vibrations are no longer detected.

10 In other embodiments, the present invention comprises a tracking bar code generation device and a tracking bar code verification system for verifying that a tracking bar code is present on the item to be shipped.

15 The present invention is also directed to a two-way communication system, in particular a communication means coupled to the inventive mail processing and storing system's computer, for communicating between the inventive system and an external computer located at a remote station or location. Preferably, the two-way communication system operates to provide the following functions:

- 20 (1) Credit authorization and charge reporting;
- (2) Transaction and tracking information transfer;
- (3) Error reporting and machine-full notification to a remote monitoring station;
- (4) Automatic money transfer to the postage meter; and
- 25 (5) Electronic mail and EDI (electronic data interchange) facilities for users.

BRIEF DESCRIPTION OF THE FIGURES:

30 The objects, advantages, and features of the invention will become more apparent by reference to the drawings which are appended hereto, wherein like numerals indicate like parts and wherein an illustrated embodiment of the invention is shown, in which:

a Fig. ~~1a~~^{1A} is a perspective view of one embodiment of the inventive mail system for processing and storing items comprising a weighing means and storage area for weighing and storing items, especially packages, on one side of the system, and a separate weighing means and storage area on the other side of the system for weighing and storing letters.

a Fig. ~~1b~~^{1B} is a perspective view of an alternate embodiment of the inventive mail system for processing and storing items comprising an internal tracking bar code verification system designed specifically for letters as well as an external tracking bar code verification system for mail items (i.e. letters and packages).

a Fig. ~~2a~~^{2A} is a front elevation view of the inventive mail system illustrated in Fig. 1a showing the package processing mechanism.

a Fig. ~~2b~~^{2B} is a side view of the inventive mail system illustrated in Fig. 1a and 4a showing the package processing mechanism.

a Fig. ~~2c~~^{2C} is a side view of the inventive mail system illustrated in Fig. 1a and 4b showing the tilting mechanism for depositing a package from the secured item acceptance area into a secured storage area.

Fig. 3 is a front elevation view of the outer door mechanism of the secured item acceptance area.

25 Fig. 4 is a top view of the inventive system's rotatable postage meter at elevation + 40.00".

a Fig. ~~4a~~^{4A} is a side view of the letter handling mechanism comprising a postage meter and automatic feed means.

a Fig. ~~4b~~^{4B} is a top view of the inventive system's rotatable postage meter at elevation + 40.00" showing the rotatable postage meter in the retracted, home position for printing a postage meter stamp onto a letter.

4C

Fig. ~~4c~~^{4C} is a top view of the inventive system's rotatable postage meter at elevation + 40.00" showing the rotatable postage meter in the forward position and ready for printing a postage meter stamp onto a letter.

4D

Fig. ~~4d~~^{4D} is a top view of the inventive system's rotatable postage meter at elevation + 40.00" showing the rotatable postage meter rotated and in the retracted, home position for printing and dispensing a postage meter strip.

4E

Fig. ~~4e~~^{4E} is a top view of the inventive system's rotatable postage meter at elevation + 40.00" showing the rotatable postage meter is the forward position and ready for printing and dispensing a postage meter strip.

Fig. 5 is a side view of the alternate embodiment of the inventive system showing the internal tracking bar code verification system.

6A-6B

Figs. ~~6a-6c~~^{6A-6B} illustrates the electronic circuitry for the inventive system, in particular the computer interaction with the various peripherals, input/output cards, control cards, and I/F cards.

Fig. 7 is a layout of the electronic hardware at the upper computer tray.

8A-8C

Figs. ~~8a-8c~~^{8A-8C} are electrical schematic diagrams.

Fig. 9 is a schematic diagram of the multiport card.

Fig. 10 is a layout of the distribution PC board.

11A-11B and 12A-12B

Figs. ~~11a-11b and 12a-12b~~^{11A-11B and 12A-12B} are flow charts illustrating the processing of a regular first class letter.

13A-13B

Figs. ~~13a-13b~~^{13A-13B} are flow charts illustrating the processing of a first class certified letter.

14A-14B

Figs. ~~14a-14b~~^{14A-14B} are flow charts illustrating the processing of a first class international letter.

Fig. 15 is a flow chart illustrating the customer inquiry process for a letter.

16A-16B
a Figs. ~~16a-16b~~^{16A-16B} are flow charts illustrating the processing of a package.

a Figs. ~~17a-17b~~^{17A-17B} are flow charts illustrating the customer inquiry process for a package.

5 Fig. 18 is a flow chart illustrating the package and letter manifest process.

Figs. 19-23 are data flow diagrams showing the interaction between the inventive system and the software as disclosed in the present invention.

10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS:

The present invention is related to automated self-service package and letter mailing systems which will process and securely store letters and packages of various sizes for
15 subsequent pick-up by a carrier, such as the United States Postal Service (U.S.P.S.), United Parcel Service (U.P.S.), and Federal Express, for example. The mailing system (100) shown in Fig. 1a has been specifically configured to the requirements and specifications of the U.S.P.S.; however,
20 obvious modifications will be readily appreciated by those of skill in the art having the benefit of the teachings and suggestions of the present invention, in particular such modifications as are required by a particular shipping carrier, and thus are contemplated to be within the scope of
25 the present invention.

The inventive "mailing system" as described herein refers to the inventive automated self-service package and letter processing and storing system as depicted in the figures and more fully described and claimed below. There are two basic
30 embodiments of the present invention, as illustrated in Figs. 1a and 1b. Fig. 1a illustrates a preferred system (100) that is configured to meet the specifications of the United States

Postal Service and comprises a means for weighing and depositing a letter and a separate means for weighing and depositing a package. As discussed below, the system (100) in Fig. ~~1a~~^{1A} could be modified, for example, to include a single means for weighing and depositing both packages and letters. The system (100) in Fig. 1a may also include an external tracking bar code scanner (151). Fig. ~~1b~~^{1B} illustrates an alternative system (101) comprising an internal tracking bar code verification system for letters. System (101) in Fig. 1b could also be modified, for example, to include a separate weighing means for a letter. Similarly, system (100) in Fig. ~~1a~~^{1A} could be modified to include an internal tracking bar code verification system, as well. Consequently, the following description of the aspects of the inventive system applies to both inventive mailing systems (100, 101) as illustrated in Figs. ~~1a~~^{1A} and ~~1b~~^{1B}.

The mailing system of the present invention is completely controlled via a computer (1308), as shown in Fig. 7, and a user-friendly, software program as illustrated in the flow charts (Figs. ~~11a-11b, 12a-12b, 13a-13b, 14a-14b, 15, 16a-16b, 17A-17B~~^{16B, 17A-17B} and 18) and data flow diagrams (Figs. 19-23). Preferably, an I.B.M. compatible computer using an Intel 386 for the CPU, having a minimum 33 HZ clock speed, is employed. The inventive software is further defined by its source code, which is provided in the attached Appendix A.

The data flow diagram illustrated in Fig. 19 depicts the overall flow of data among various software subsystems and the control executive (Z) present in the inventive mailing system. Specifically, Figs. 20, 21, 22, and 23 further illustrate the flow of data to and from the letter handling subsystem (L), report generation subsystem (R), package handling system (P), and the machine control subsystem (M),

respectively, within the system.

a Referring now to Figs. ^{1A}~~1a~~ and ^{1B}~~1b~~, the mailing system (100, 101) comprises an outer housing having a front side (102a), a back side (102b), a left side (102c) and a right side (102d), wherein preferably the right side of the housing (102d), for example, is set up for processing and storing letters and the left side (102c), for example, is configured to process and store packages. Alternatively, the system (100, 101) could be configured to have only the features of the left side (102d) where both letters and packages could be processed and stored together, as discussed in more detail below. Some preferred basic features of the inventive mailing system (100) as shown in Fig. ^{1A}~~1a~~ include a display means, more preferably a touch-screen activated monitor (110), a magnetic user identification card reader (122), a transaction receipt printer (128) and a package label printer (142), an internal letter handling mechanism (132), a letter platform (150) comprising, as shown in Fig. 4, a postage meter strip plate (201) and a letter weighing scale comprising a weigh plate (200) and a load cell (215) contained within the platform, an outer letter security door (213), a secured item acceptance area (106) comprising an outer security door (108), and preferably a left-hand outer system door (160) and a right-hand outer system door (161) for allowing access into the system by authorized personnel, including a lock mechanism (154) for preventing access into the mailing system by unauthorized individuals. The system also comprises an electronic sliding tray (130) containing the computer (1308) and other electronic features of the system, including for example, the computer power supply (1304), the serial multi-port expansion strip (1314), stepping motor power supplies (1216, 1218), and the PC distribution board (1302) as shown

a in Fig. 7. Fig. 10 illustrates the PC distribution board
(1302) shown in Fig. 7. Figs. ^{8A} ~~8a~~, ^{8B} ~~8b~~, ^{8C} ~~8c~~, and 9 illustrate
the electrical schematics of the distribution board (1302),
including the operation of different homing sensor devices
a 5 (1242) (Fig. ^{8A} ~~8a~~) which inform the computer that the different
devices in the machine are at their home position (e.g.
postage meter rotation, discussed below); different pin
connections (Fig. ^{8B} ~~8b~~) on the motor controller card /IO card
that further input to the computer information from the banner
10 units (148, ~~150~~); relays which operate the postage meter
travel (1254), safety switch (1226), and package dump (1250)
a devices shown in Fig. ^{8C} ~~8c~~; and the RS232C controller card that
controls various printers shown in Fig. 9. Other features of
the inventive mailing system, both internal and external, as
15 well as alternative embodiments of the present invention will
be discussed in more detail below in the description of the
operation of the inventive mailing system.

The inventive mailing system is designed to process and
store letters and packages for subsequent shipment and
20 operates by electronically interacting with a user via an
inventive, user-friendly, software program. Referring again
a to Figs. ^{1A and 1B} ~~1a and 1b~~, the mailing system (100, 101) preferably
includes a computer monitor (110) which displays a continuous
video demonstration on how to operate the mailing system. The
25 video demonstration is preferably stored on a CD Rom video
unit (147) which is connected to the computer (1308) via an
analog to digital video card. Other suitable video devices,
such as a computer-controlled VHS video cassette system as
well as other computer-controlled video systems may be
30 employed.

To perform a mailing transaction, the user will interact
with a communication means which is mounted on the outer

housing. A more preferred communication means is a display means, most preferably a computer monitor (110) equipped with a touch-sensitive screen with which the user interacts to input requested information for processing a mail item. The
5 screen may be a conventional touch-screen activated by infra-ray, sonic waves, or resistance screen. While the operation of the present inventive mailing system will be described with reference to the touch-screen activated computer monitor (110), which is the most preferred type, other types of
10 communication means are contemplated within the scope of the present invention, and thus may be employed. For example, a conventional computer monitor may be employed that is coupled with an alphanumeric key pad or keyboard. In this latter embodiment, the user inputs information into the mailing system via the key pad or key board. Alternatively, the
15 communication means may be a voice-activated system, such as a digitized voice recognition system for receiving user input, such as that manufactured by Dragon Systems, for example, whereby the mailing system, via the software and computer
20 (1308), operates in response to the user's spoken commands. In this third embodiment, the communication means may utilize a display means such as a computer monitor for providing instructional information visually to a user, or it may provide such information to a user by an audio means such as
25 a digitized voice system, for example.

To initiate a mailing transaction, the user approaches the mailing system (100, 101) and touches the screen to cause the screen, or a digitized voice recognition system through microphone (112), and/or video instruction on touch-screen
30 (110) to be activated which will in turn instruct the user to perform the next step in the operation. Following the flow diagrams illustrated in Figs. ~~11a-11b, 12a-12b, 13a-13b, 14a-~~
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14B, 15, 16A-16B, 17A-17B

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A ~~14b, 15, 16a-16b, 17a-17b,~~ and 18, the user selects a language for conducting the transaction, such as English or Spanish, for example. The user is then requested to enter a means for payment, most preferably user identification information for the purpose of payment, preferably by swiping or inserting a user identification data entry means such as a magnetic credit/debit card, through or into a magnetic card reader (122). Alternatively, the user could be instructed to input a user identification code, such as a personal identification number (PIN) and/or an account number, for example, via the touch-screen or a key pad/keyboard mechanism, for example. It is contemplated that the inventive system could be modified by one of skill in the art, having the benefit of the invention's teachings and suggestions, to accept payment in the form of cash (i.e. coins and/or bills) after the total charge has been determined. Once the computer (1308) identifies the correct information from the credit/debit card, for example, it will transmit this information via a modem (1262) and telephone line (1264) (Fig. ^{6c}~~6c~~) to an external credit/debit authorization center. Once the authorization is obtained, the software program will automatically activate the next screen which will request the user to make a selection between various services offered through the commercial carrier. The software flow diagrams illustrated in Figs. ~~11a-11b, 12a-12b, 13a-13b, 14a-14b, 15, 16a-16b, 17a-17b, and~~ 18 depict services offered by the U.S.P.S.; however, the computer system may be programmed with additional and/or different mailing services unique to other commercial carriers (e.g. Federal Express Two-Day and Overnight). The remaining descriptions of the operation of the inventive mailing system, including the figures contained herein, will be for a mailing system designed for shipping by the United States Postal

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ms.

Service (Fig. ^{1A}~~1a~~, for example) or the United Parcel Service (Fig. ^{1B}~~1b~~, for example).

Preferably, the inventive mailing system (100), such as that configured per U.S.P.S. specifications and requirements, will allow a user to process a letter for a particular type of first class delivery. The process for mailing packages is discussed later. Referring now to the figures, in particular

^{a5} ~~Figs. 1a, 4, 4a-4e, 6a-6c, 11a-11b, 12a-12b, 13a-13b, 14a-14b, 15, 16a-16b, 17a-17b, and 18,~~ the user is requested to make a mail service selection. To process and mail a letter first class, for example, the user selects one of the First Class services (e.g. First Class Regular). The following figures illustrate the flow diagrams for processing a letter First Class: ^{11A-11B} ~~Fig. 11a-11b~~ (Regular), ^{12A-12B} ~~Figs. 12a-12b~~ ("Save A Day"), ^{13A-13B} ~~Figs. 13a-13b~~ (Certified), and ^{14A-14B} ~~Figs. 14a-14b~~ (International) and Fig. 15 (Customer Inquiry, First Class Letter).

Next, a postage meter (211) is orientated into the correct position for generating a postage meter stamp or strip. For letters, the postage meter (211) is designed to print the postage meter stamp directly onto the letter. For items such as packages or letters that are not fed through the postage meter, the postage meter is preferably capable of printing and dispensing a postage meter strip for subsequent affixation onto the item by the user. Preferably, a rotatable postage meter is used which will dispense the stamp in the form of a postage meter strip directly to the user through the outer housing. This postage meter rotation system (205) is completely controlled via the computer (1308) and digital I/O port B (See Fig. ^{6A}~~6a~~). The computer (1308) will utilize a software control program which rotates the meter according to pre-determined conditions. If the postage meter (211) is in

a the home or retracted position (b) as shown in Fig. ^{4B}~~4D~~, for example, the software program via the computer (1308) will cause the postage meter (211) to move forward toward the front side of the outer housing (position c) utilizing a horizontal linear actuator (207) and a translation table (216), as shown in Fig. 4c, for example. This movement will bring the postage meter (211) to a position for receiving a letter and for printing a postage meter stamp directly onto the letter.

10 The inventive system (100) most preferably comprises an automatic feed transport system (149) which is capable of automatically feeding the letter directly into the postage meter (211). As shown in Fig. ^{4A-4E}~~4a-4e~~, in particular Fig. ^{4A}~~4a~~, a the automatic transport system (149) preferably comprises a series of rollers (149a) contained within a letter platform 15 (150). Integral with the platform (150) is a meter strip plate (201) and an electronic letter weighing scale comprising a weigh plate (200) and a load cell (215). To weigh the letter, the user places the letter onto the weigh plate (200). The presence of the letter is then detected by an optical 20 sensor (225). The load cell (215), which is connected to the computer (1308) via Analog to Digital weigh card (1202) and the software program, as shown in Figs. ^{6A-6C}~~6a-6c~~, a the load cell will not weigh the letter until such time as the user has removed his or her hand. This 25 is done by utilizing a software algorithm which will detect minute vibrations which are always present when a human being is touching a scale. The special weighing algorithm is also illustrated in its entirety in the attached appendices, specifically Appendix B. While the letter (L) is being 30 weighed, the computer (1308) simultaneously checks to see if the postage meter (211) is in the correct position to accept the letter through the automatic feed system (149). The

computer determines the postage meter position by particularly looking into the inputs of limit switch (209) and limit switch (204). If limit switch (204) is in the ON position, then the postage meter is in the correct position to accept the letter.

5 In this case, the computer will activate linear actuator (207) which will move the translation table (216) to the forward position (c) (Fig. ^{4C}~~4e~~). However, if the computer detects that limit switch (209) is in the ON position and limit switch (221) is in the OFF position, it will cause the linear
10 actuator (207) to retract until such time as limit switch (221) will be in the ON position. This operation is particularly important as the postage meter (211) cannot be rotated in any other position but the backward position. All rotation of the postage meter (211) to the letter position (c) or the postage meter strip dispensing position (e), as shown
15 in Figs. ^{4C and 4E}~~4c and 4e~~, respectively, must take place in the backward position in which linear actuator (207) is retracted (positions b and d as shown in Figs. ^{4B and 4D}~~4b and 4d~~, respectively).
a Once this position is achieved, the computer will activate the
20 rotation motor (202) to rotate the postage meter rotation table (203) which is supported on at least one rotation bearing (210).

Once the postage meter is in a forward position (in either letter position or meter strip position), the outer
25 letter security door (213) will be opened utilizing linear actuator (214). This will allow the letter to be picked up by the postage meter (211) through an opening above the letter guide (212), as discussed further below, or will allow a postage meter strip to be dispensed from the meter strip
30 holder (299) onto into the meter strip plate (201).

Once the letter is weighed, the computer will receive the weight measurement via the A/D weigh card (1202), and

utilizing the rate tables stored on the computer hard disc (1210) and the software program, the computer (1308) will calculate the cost for sending the letter. After the system displays the charge amount to the user, the user is requested to touch the touch-screen (110) which will display an Approval Touch Button for purposes of continuing the transaction. Where an autofeed mechanism is not used, the user is asked to insert the letter into the letter acceptance slot (104), located behind the outer letter security door (213), to continue the mailing transaction. Alternatively, the user may select other options in lieu of continuing the transaction, in particular to cancel the transaction or perform a different transaction. Once the user touches this button, the computer will activate the postage meter (211) through relay (1231) (Fig. ^{6A}~~6a~~), lower the outer letter security door (213), and then activate the automatic transport means (149) (if present). This will send the letter, guided by a letter guide (212), into the postage meter (211). Once the letter passes through the postage meter and is imprinted with the postage meter stamp, the letter will hit the letter deflector (208) which will direct the letter into a secured storage area, such a letter tray (134), preferably located below the postage meter as shown in Figs. ^{1A and 4A}~~1a and 4a~~. Once the letter passes through the postage meter (211), the outer letter security door (213) will close and will not open again until another letter is detected by the optical sensor (225) (Fig. 4).

At the end of any particular transaction, the inventive system requests whether the user wants a receipt. If the user chooses a receipt, a receipt printer (128) (Figs. ^{1A and 6C}~~1a and 6a~~) will print a detailed receipt which will include all the information about the user's particular transaction, including, for example, time, date, location, machine number,

type and amount of transaction, and number of transactions.

To process and store a package for mailing, the user preferably follows the flow diagrams illustrated in Figs. ^{16A}~~16a~~

^{16B}~~16b~~. Similarly, the following description for processing and
5 storing a package could be applied to a letter. Once the user
has entered payment, most preferably his or her user
identification information, and has selected to mail a
package, the computer will activate a mechanism, including a
software controlled system, to position the postage meter
10 (211) into the correct orientation for printing and dispensing
a postage meter strip directly to the user. As discussed
above, the postage meter (211) is preferably also capable of
directly printing a postage meter stamp onto a letter. Thus,
in order to dispense a postage meter strip directly to the
15 user for affixation onto a package, for example, a preferred
aspect of the present invention is that the postage meter
(211) be capable of rotating, as previously discussed in
greater detail, so that the postage meter can dispense the
postage meter stamp directly to the user through the front
20 side of the outer housing (102a). For dispensing a postage
meter stamp, if the postage meter is not in the home or
retracted position (d), as shown in Fig. ^{4b}~~4d~~, the software
^a controlled system will properly orientate the postage meter
by first retracting the postage meter from forward position
25 (c) to the home position (b) by utilizing a linear actuator
(207) if the limit switch (221) is not activated. Once the
limit switch (221) is activated, the software control program
will operate the rotation motor (202) which will rotate the
postage meter about 180 degrees to a new position (d), as
30 illustrated in Fig. 4d, which will be detected by limit switch
(209). Once this rotation is completed, the postage meter
will move forward to position (e), as shown in Fig. ^{4E}~~4e~~,
^a

utilizing linear actuator (207), which will stop automatically by utilizing an internal switching mechanism. Another aspect of the postage meter (211) is that it preferably contains an optical sensor (220) to sense the presence of postage meter strips in the special built-in meter strip holder (299). If the optical sensor (220) senses no meter strips in the holder (299), it will send a signal utilizing digital I/O port B. The computer (1308) in turn will display a video message on a display screen (110), or communicate via an audio means that the holder (299) is empty and inhibit the package mailing operation until such time as more meter strips are added to the postage meter (211).

The user will also be requested to input shipping designation information for the package, including the ZIP code, preferably via the touch-screen activated monitor (110). This information is processed through the computer (1308), and in conjunction with the weight information obtained later for the package, is used to calculate the shipping charge.

Once the computer (1308) identifies the correct information from the user information card, for example (i.e. if payment is made by this means), it will transmit this information via modem (1262) and telephone line (1264) (Figs. 6B-6C) to an external credit/debit authorization service center. Once the authorization is obtained, the software program will automatically activate the next screen which will request the user to make a selection between various services offered through the particular commercial carrier. By using a communication means, preferably either digitized voice instructions or video instructions, the user will be instructed to put his or her package into a secured item acceptance area or holding area (106). An outer security door (108) will automatically open, as discussed in more detail

below, and the user will be able to place his package within a holding space or zone containing an item-holding platform or bin (108) capable of tilting towards the back side of the outer housing (102b) to deposit the item into a secured storage area (410) at the appropriate time. The tilting mechanism used to deposit the item into a secured storage area (410) is discussed in more detail below.

Referring now to Fig. 3, the outer door (108) operating mechanism includes the outer door (108), guides (1100), pulley (1112), stepper motor (1102), optical sensor (1108), locking solenoid (1111), and flexible curtain (1113). Once the user selects to send a package, the computer (1308), utilizing a software control program, will unlock locking solenoid (1111) and activate stepper motor (1102) which will lower the outer door (108) to a pre-determined position. Once the user has completed his transaction and placed the package back onto the item-holding platform (408) inside the holding space, the computer (1308) will activate stepper motor (1102) and raise the door to a level in which the optical detector (1108) will be blocked. The computer (1308) will release the locking solenoid (1111), which is spring-loaded in the locking position. This is done in order to keep the outer security door (108) locked at all times, including during a loss of electrical power. At this point, the weighing scale will verify that the package weight did not change, as discussed in more detail below. When the outer security door (108) closes, an intentional gap is left open which is covered or closed by a flexible curtain (1113) in case some user should leave his hand on the door while the door is being raised. By leaving this intentional gap, the outer security door (108) will never close to the point of squeezing the user's hand.

Referring now to Figs. 2A-2C, a weighing device (138)

comprising a load cell (400) integral with a rotating block (406b) is mounted below the platform (408) which in turn is integral with at least one mechanical arm (404) used to move the inner door (402). The rotating block (406b) is movably secured to a fixed block (406a). The user is instructed to place the item onto the platform (408), which will activate the weighing device to weigh the item via the load cell (400). The load cell (400), which is connected to the computer (1308) via Analog to Digital weighing card (1202) (Fig. ^{6A} 6a) and the software program, will not weigh the package (602) until such time as the user has removed his or her hand. This is done by utilizing a software algorithm which will detect minute vibrations which are always present when a human being is touching a scale, as discussed above. Once the item is weighed, the computer will receive the weight measurement via the A/D weighing card (1202) and utilizing the rate tables stored on the computer hard disc (1210) and the software program, as well as the shipping designation data entered, will calculate the cost of sending this package. The user will be asked to touch the screen (110) which displays an Approval Touch Button for continuing the transaction. Alternatively, the user may select other options in lieu of continuing the transaction, in particular to cancel the transaction or perform a different transaction. Once the user touches this button, the computer will activate the postage meter (211) through relay (1231), which will lower the outer letter security door (213), and the postage meter (211) will dispense a postage meter strip onto the meter strip plate (201). The user will then be instructed to paste the meter strip onto the package (602).

If the user desires to print his own shipping label, he will be able to do so by touching a print label touch button

which will activate either a touch-screen alphanumeric keyboard (110) or a hidden-keyboard (156), which will come out for the user to use, such as that illustrated in Fig. ^{1B}~~1b~~, for example. Once the user has completed typing in the label, he will again touch the Print Label Button, at which time the hidden keyboard (156) will retract, and a label will be printed utilizing package label printer (142) (Figs. ^{1A, 1B}~~1a, 1b~~, and ^{6C}~~6c~~). A user may also select to print a bar code label which can be utilized as a Zip+4 label or a tracking label. This label will be printed automatically using the address information entered by the user and utilizing bar code printer (127) (Figs. ^{1a, 1B, and 6C}~~1a, 1b, and 6c~~).

Once the user has completed pasting on the postage meter strip, the address label, and optionally the bar code label on his package, he will return the package to the secured item acceptance area (106), specifically onto the item-holding platform or bin (408). At this time, the outer security door (108) will automatically close to prevent the user from having access to the package. Once the outer security door (108) is closed, the computer (1308) will perform a second weighing in order to verify that the package weight has not been changed. If the second weight amount does not differ from the first weight amount, the mechanism for depositing the item into the secured storage area is activated by means of a linear actuator (409). The linear actuator (409) causes the platform (408) to tilt via using at least one mechanical arm (404), which in turn will open the inner door (402), and the package (602) will preferably drop onto padded step (403) which dampens the fall of the package (602) as it is deposited into the secure storage area or zone (410). Once this area is full to the point that the next item is unable to slide off the tilting platform (408), a built-in optical sensor (411) on the

platform (408) will prohibit the movement of the linear actuator (409) and will cause a message to appear on the system that the internal storage area (410) is full. It will also send a message to this effect, utilizing Modem (1262),
5 to an external monitoring station which will inform the carrier to provide an unscheduled pick-up.

If the second weight amount is different from the first weight amount, the outer security door (108) will automatically open, and the system will instruct the user to
10 remove the package from the holding area, thus cancelling the transaction.

The user will be able to repeatedly process other packages, one at a time, utilizing the same steps, but without requiring the use of his or her user identification
15 information card again. Once the user has completed all of his or her transactions, the user may request a printed receipt which will be printed utilizing receipt printer (128).

If the user decides to buy a book(s) of stamps, which are the standard type provided by the U.S.P.S., he will be
20 able to do so by either paying with his credit/debit card or utilizing cash (dollar bills) via a cash acceptor (152). To utilize his credit/debit card, the user will follow a similar path as described previously, however he will select Book of Stamps. He then will be required to indicate, by touching the
25 touch-screen, how many books he desires. Once he touches the desired number, the computer will operate the stamp dispenser relay (1231) and the books will be dispensed via the stamp dispenser (153). If the user selects cash, he will be
30 instructed on the screen to place his money into the cash acceptor (152). Once the correct amount of cash is received by the system, which is transmitted to the computer via a communication port 2 (Fig. ^{6B}~~6A~~), the computer (1308) will
A

activate relay (1231), which in turn will dispense the correct number of books through stamp dispenser (153). The inventive system (100, 101) may also include a user pre-processing area comprising, for example, a work tray (114) and a ruler (116) to assist the user in preparing his or her letters or packages for processing and storing in the system.

If the user desires to send his letter via Electronic Mail (E-Mail) or to utilize the built in FAX machine (120), he can do so by swiping or inserting his credit/debit card through or into the magnetic card reader (122). However, the user will be requested through the instructions provided by a communications means, such as a digitized voice system or a touch-sensitive screen (110), to either insert his floppy disc into the floppy disc drive [(124) 3.5" discs or (126) 5.25" discs] or insert his letter into the FAX machine (120) top slot. The computer (1308), which has a software program to accept this kind of information, will automatically FAX the letter utilizing Modem (1262) to its destination or will transmit the file read off the floppy discs (124, 126) to the appropriate telephone number requested by the user utilizing Modem (1262).

The U.S.P.S. or other carriers will provide scheduled pick-up service on the system. The postal worker will open the two front doors of the system utilizing lock (154). By opening the two doors, the worker will be able to collect the letters from the letter tray (134) and the items, preferably packages, from the lower storage area (410). The user will also be able to print a shipping and mailing manifest which will give a summary of the different letters and packages accumulated since the previous pick-up. Fig. ^A1a shows a preferred placement of the shipping and mail manifest printer (144) and a full-size (i.e. 8 1/2" X 11") auxiliary manifest

printer (140).

Certain commercial carriers, such as the United Parcel Service (U.P.S.), for example, require the affixation of a tracking bar code onto the package or letter. U.P.S., for example, provides labels or forms pre-printed with a tracking bar code for affixation onto an envelope. Thus, as discussed above, another preferred alternative embodiment of the present inventive system (101) is an automated mail processing and storing system comprising a tracking bar code system which can (1) detect whether the tracking bar code is present on the item and (2) generate and/or allow the entry of a tracking bar code for a mail item.

A system comprising such a tracking bar code system is illustrated in Fig. ^{1B}~~1A~~. As discussed above, however, it is contemplated that additional features, such as a letter weighing scale or postage meter, for example, could be included, as well.

Referring now to Figs. ^{1B}~~1A~~ and 5, the mailing system (101) preferably contains an area for processing letters and an area for processing packages. For processing letters and packages, the user begins the operation of the system (101) the same way as for the system (100) described above and illustrated in Fig. ^{1A}~~1A~~. However, for processing letters for U.P.S., for example, the use of special labels or forms containing the tracking bar code for subsequent affixation onto an envelope does not necessitate the use of a weighing scale or postage meter. Similarly, while U.P.S. as well as perhaps some other carriers do base their charges for shipping a package in part on weight, no postage stamp is required, thus rendering a postage meter unnecessary. However, such a system could include a postage meter, if desired.

As discussed above, to perform a mailing transaction, the

user will interact with a communication means which is mounted on the outer housing. A more preferred communication means is a display means, most preferably a computer monitor (110) equipped with a touch-sensitive screen with which the user interacts to input requested information for processing a mail item. The screen may be a conventional touch-screen activated by infra-ray, sonic waves, or resistance screen. While the operation of the present inventive mailing system will be described with reference to the touch-screen activated computer monitor, which is the most preferred type, other types of communication means are contemplated within the scope of the present invention may be employed. For example, a conventional computer monitor may be employed that is coupled with an alphanumeric key pad or keyboard. In this latter embodiment, the user inputs information into the mailing system via the key pad or key board. Alternatively, the communication means may be a voice-activated system, such as a digitized voice recognition system for receiving user input, such as that manufactured by Dragon Systems, for example, whereby the mailing system, via the software and computer (1308), operates in response to a user's spoken commands. In this third embodiment, the communication means may utilize a display means such as computer monitor for providing instructional information visually to a user or it may provide such information to a user by an audio means, such as a digitized voice system, for example.

To initiate a mailing transaction, the user approaches the mailing system and touches the screen to cause the screen, a digitized voice recognition system through microphone (112), and/or video instruction on a touch-screen (110), to be activated which will in turn instruct the user to perform the next step in the operation. Following the flow diagrams

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ms.

~~illustrated in Figs. 11a-11b, 12a-12b, 13a-13b, 14a-14b, 15,~~
~~16a-16b, 17a-17b, and 18,~~ the user selects a language for
conducting the transaction, such as English or Spanish, for
example. The user is then requested to enter a means for
5 payment, most preferably user identification information for
the purpose of payment, preferably by swiping or inserting a
user identification data entry means such as a magnetic
credit/debit card, through or into a magnetic card reader
(122). Alternatively, the user could be instructed to input
10 a user identification code, such as a personal identification
number (PIN) and/or an account number, for example, via the
touch-screen or a key pad/keyboard mechanism, for example.
As discussed above, it is also contemplated that the inventive
system could be modified by one skilled in the art, having the
15 benefit of the invention's teachings and suggestions, to
accept payment in the form of cash (i.e. coins and/or bills)
after the charge has been determined. Once the computer
(1308) identifies the correct information from the
credit/debit card, for example, it will transmit this
20 information via a modem (1262) and telephone line (1264) (Fig.
a 6c ~~6c~~) to an external credit/debit authorization center. Once
the authorization is obtained, the software program will
automatically activate the next screen which will request the
user to make a selection between various services offered
25 through the commercial carrier.

For processing letters requiring a tracking bar code,
this alternative embodiment of the inventive system (101) will
ensure that no envelope is accepted into the letter tray (134)
without first checking that the tracking bar code has been
30 pasted or printed on the envelope, or has been allocated by
the computer or scanned manually by the user using the
external bar code scanner (151). For U.P.S. and perhaps some

other carriers, the user must use designated envelopes and labels or forms for affixation onto the envelope supplied by the carrier, wherein the labels or forms contain the individual tracking bar code. The carrier will charge the user a fixed fee as long as the user uses the designated labels and envelopes for sending his or her documents. These labels and envelopes may be stored in a tilt-out supply cabinet (119), such as the one shown in Fig. ^{1B} 1B, for example. The user will then follow the digitized voice instructions or the visual instructions on the touch-screen (110) to continue the transaction. Once the user has entered all the information requested by the carrier so that the computer can calculate the shipping charge, this shipping charge will be displayed on screen (110), and an Approval Touch Button will be displayed for purposes of continuing the transaction. Once the user has touched this button, the outer letter security door (206) will open to reveal a letter chute (205). Once the user places the envelope into the letter chute (205), the optical sensor (204) will activate the internal bar code scanner (155). Once the bar code scanner (155) reads the tracking bar code on the envelope, linear actuator (202) will open the inner letter door (203), and the envelope will drop into the letter tray (134) below. If the bar code scanner (155) is unable to read the bar code on the envelope, it will request the user to either turn the envelope over or to enter the tracking bar code number utilizing a touch-screen (110) keypad or the external bar code scanner (151), for example. Once this is completed, the linear actuator (202) will open the internal letter door (203), and the envelope will drop into the letter tray (134) below. However, if the user has selected to print his own shipping label using printer (142), for example, which automatically prints a tracking bar code,

or has used the external bar code scanner (151) to scan the bar code before placing the envelope into letter chute (205), the computer will immediately activate linear actuator (202) which will open the inner letter door (203), and the envelope will drop into the letter tray (134).

For processing and storing a package for shipment by carriers such as U.P.S., for example, which require a tracking bar code, the same system components and method as discussed above for processing packages via U.S.P.S., or example, and illustrated in the figures are employed. Typically, however, the system does not require a postage meter, since the charge for shipping a package via U.P.S., for example, is not required to be placed on the package. However, the system can include a postage meter, if desired. In addition, the charge could be printed on the same label containing the tracking bar code if desired or required by another carrier.

Once the computer (1308) identifies the correct information from the user information card, or example (i.e. if this means for payment is used), it will transmit this information via modem (1262) and telephone line (1264) (Figs. ~~6B-6C~~ ^{6B-6C}) to an external credit/debit authorization center. Once the authorization is obtained, the software program will automatically activate the next screen which will request the user to make a selection between various services offered through the particular carrier. By using a communication means, preferably either digitized voice instructions or video instructions, the user will be instructed to place his package into a secured item acceptance area (106). An outer door (108) will automatically open as discussed above, and the user will be able to place his package on an item-holding platform or bin (408) capable of tilting towards the back side of the outer housing (102b) to deposit the item into a secured

storage area (410) at the appropriate time. The same outer door mechanism as discussed above for the inventive mailing system (100) and further illustrated in Fig. 3 is applicable to this embodiment of the inventive mailing system (101).
5 Further, the same tilting mechanism used to deposit the item into a secured storage area (410) as already discussed above for the inventive mailing system (100) is used.

The user will also be requested to input shipping designation information for the package, including the ZIP
10 code, preferably via the touch-screen activated monitor (110). This information is processed through the computer (1308), and in conjunction with the weight information obtained later for the package, is used to calculate the shipping charge.

Referring again to Figs. ^{2A-2C}~~2A-2C~~, a weighing device (138)
15 comprising a load cell (400) integral with a rotating block (406b) is mounted below the item-holding platform (408) which is integral with at least one mechanical arm (404) used to move the inner door (402). The rotation block (406b) is movably secured to a fixed block (406a). The user is
20 instructed to place the package (602) onto the platform (408), which will activate the weighing device to weigh the item via the load cell (400). The load cell (400), which is connected to the computer (1308) via Analog to Digital weighing card (1202) and the software program, will not weigh the package
25 until such time as the user has removed his or her hand. This is done by utilizing a software algorithm which will detect minute vibrations which are always present when a human being is touching a scale, as discussed above. Once the package (602) is weighed, the computer (1308) will receive the weight
30 measurement via the A/D weighing card (1202) (Fig. ^{6A}~~6A~~) and utilizing the rate tables stored on the computer hard disc (1210) and the software program, as well as the shipping

designation data entered, will calculate the cost of sending this package. The user will be asked to touch the screen (110) which displays an Approval Touch Button for continuing the transaction. Once the user touches this button, he will
5 be instructed to return the package to the secured item acceptance area (106) after he has pasted onto his package a tracking label provided by the carrier. Alternatively, if the user wishes to print his own shipping label, he will be able to do so by touching a print label touch button which will
10 activate either a touch-sensitive screen keyboard or a hidden-keyboard (156), which will come out for the user to use. Once the user has completed typing in the label, he will touch again the Print Label Button, and a label will be printed utilizing package label printer (142). This label will be
15 printed automatically using the shipping address information entered by the user. The printed label will include a tracking bar code which is utilized by the commercial carriers to track the movement of the package. Once the user has completed pasting the address label, which includes the
20 tracking bar code, on his package, he will first scan this tracking label using external bar code scanner (151) and then place the package back onto the item-holding platform or bin (408) in the secured item acceptance area (106). At this time, the outer security door (108) will automatically close
25 to prevent the user from having access to the package. Once the outer security door (108) is closed, the computer will perform a second weighing in order to verify that the package weight has not been changed. If the second weight amount does not differ from the first weight amount, the mechanism for
30 depositing the item into the secured storage area via the tilting motor (138) will be activated by means of a linear actuator (409). The linear actuator (409) causes the platform

(408) to tilt via at least one mechanical arm (404), which in turn will open the inner door (402), and the package (602) will preferably drop onto padded step (403) which dampens the fall of the package as it is deposited into the storage area (410) below. The area below the secured item acceptance area (106) is used as an internal storage area (410) for packages or letters. Once this area is full to the point that the next item is unable to slide off the tilting platform (408), a built-in optical sensor (411) on the platform (408) will prohibit the movement of the linear actuator (409) and will display a message on the system that the internal storage area (410) is full. It will also send a message to this effect, utilizing Modem (1262), to an external monitoring station which will inform the carrier to provide an unscheduled pick-up.

The user will be able to repeatedly send other packages, one at a time, utilizing the same steps, but without requiring him to use his user identification information card or commercial account number again. Once the user has completed all his transactions, he may request a printed receipt which will be printed utilizing receipt printer (128).

If the user desires to send his letter via Electronic Mail (E-Mail) or to utilize the built-in FAX machine (120), the same system and method as discussed above for mailing system (100) and shown in the figures, such as Figs. 1a, for example, can be employed. Similarly, an E-Mail system, and F system, a postage stamp service area, and/or a user pre-processing area (as discussed above) may be included in this alternative embodiment of the inventive mailing system (101).

Once the user has completed all of the desired operations, he will be able to request a detailed receipt which will include the bar code tracking numbers. This

a receipt will be printed utilizing receipt printer (128) (Fig. 18). This tracking information is particularly important to users who will be able to check the delivery information by utilizing touch-screen (110) and following the instructions on the screen. This tracking information will be received directly from the carrier main frame computer utilizing Modem (1262) and computer (1308).

The inventive systems (100, 101) may also comprise a package and letter manifest option, as illustrated in the flow diagram in Fig. 18. By entering the appropriate code, authorized personnel can obtain hardcopy manifest reports of items received by the machine. The manifest copy is generated by either a shipping and manifest printer (144) or a larger manifest printer (140) capable of printing larger (i.e. 8 1/2" X 11") copies and are both contained within the outer housing of the system.

a In addition to serving as a mail processing and storing system, the inventive system can also be operated by a user in an "Inquiry" mode, as illustrated in Figs. 17A-17B. For example, a user may use the system simply to look up the nine-digit ZIP code for a particular address. This feature of the system may be provided free of charge as courtesy.

The present invention is also directed to a two-way communication system, in particular a communication means coupled to the inventive mail system's computer (1308), for communicating between the inventive system and an external computer located at a remote station or location. Both inventive systems (100, 101) may include, and preferably do include, this two-way communication system.

Preferably, the two-way communication system operates to provide the following functions:

- (1) Credit authorization and charge reporting;

- (2) Transaction and tracking information transfer;
- (3) Error reporting and machine-full notification to a remote monitoring station;
- (4) Automatic money transfer to the postage meter; and
- 5 (5) Electronic mail and EDI (electronic data interchange) facilities for users.

These functions are discussed in more detail below as well as in the source code provided in the attached Appendix A.

10 When the user inserts his or her user identification information, preferably by swiping or inserting a magnetic credit/debit card through or into a magnetic card reader, the machine dials out to the credit card authorization network and receives pre-approval for a designated amount of credit. At the end of the transaction, the inventive mail system stores

15 the actual transaction amount in the computer (1308) for batch transfer, and the end of the day, the computer will be capable of providing a detailed summary of credit card usages for that day. If the user needs to spend more money than the pre-approved amount, the inventive mail system automatically

20 acquires additional credit authorization. The inventive system is preferably capable of storing detailed information on every transaction as well as tracking bar code information. At the end of the day, the inventive system transfers this information to a central accounting station.

25 The two-way communication system may also allow the service department of the particular carrier, for example, to be promptly notified electronically of fatal errors which would prohibit further use of the inventive system, and thus need immediate attention. Preventive maintenance messages and

30 non-fatal errors which do not affect the usage of the machine will be sent periodically to a remote monitoring station.

The inventive mail system always maintains a minimum

balance in the postage meter. When the balance reduces to a pre-determined minimum amount, the system will automatically dial out to a bank, for example, which will deposit a pre-designated amount of credit in the postage meter, preferably through a TMS (telephone money service) mechanism, for example. The inventive mail system and meter identification numbers are transferred automatically to the bank for accountability.

The inventive mail system provides a user interface for electronic mail (E-mail) and electronic data interchange (EDI). A user can log into any remote system via the inventive mail system and use his or her personal credit card, for example, to charge for system usage time. A floppy disk device having an opening (124, 126) and coupled to the computer (1308) is available on the outside of the outer housing for data interchange.

The inventive system may also include a communication means coupling the computer with the postage meter to provide an automatic meter imprint date change mechanism. The postage meter automatically changes the imprint date at midnight. However, the inventive mail system can send commands through the communication means to the postage meter to activate and advance the date mechanism at a designated article pickup time to reflect and print a new date after the designated pickup for that day. The same date change mechanism is used for holidays and weekends when there is no scheduled article pickup.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and changes in the size, shape, and materials, as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.